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# Knowledge Transfer and Impact?

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## Abstract

This paper suggests a comparison framework to try and evidence the impact of knowledge transfer. It examines impact by reporting on the outputs from case studies across two sectors, manufacturing and healthcare. The paper assesses the impact of knowledge transfer, in relation to the development of a competitive edge and proposes some initial frameworks for potential application and use.

**Keywords:** knowledge transfer, universities, impact

## Introduction

The concept of the competitive edge, of having an advantage over competitors, generating greater sales/margins than competition, can be achieved through cost structure, product offerings, distribution network or customer support (Bhattacharjee and Chakrabarti, 2015; Su et al 2014; Ram et al, 2014; Soloducho-Pelc, 2014). Universities can tangibly support this through generating innovative products and processes through their engineering research, providing cures and therapies in medical research, and offering fresh insights and perspectives in social and economic research, including schools of business and management (Arthur, 2010). Of course, there is much value to be had not only in the commercialisation of this knowledge but for improving efficiencies and practices in public and private businesses.

## Literature Review

Technology transfer is a frequently cited objective and aspiration for governments, businesses and universities alike – a holy grail which, if executed positively, will have profound benefits for all three groups, and for society as a whole. Given its importance, however, the literature is still relatively sparse in terms of providing usable models for transfer, whether for practical purposes or for structuring research enquiry. A major issue here is that projects entitled “technology” transfer are often seen predominantly from a technical perspective by those involved, whereas most projects are clearly more a transfer of know-how and human capital between parties (Bamford, Forrester and Ismail, 2011). To help define this in an objective manner we have adopted and applied an early innovation assessment model, the Ansoff framework (Ansoff, 1957). This is a

classic product–market strategy matrix which implies that products and markets are interdependent and inter-determining (Finch and Geiger, 2011). Within this paper technology is more narrowly defined as the transfer of management know-how and processes to address real business needs at the partnering companies.

Porter (1980) explained that the competitive advantage source is within the firm's capacity to differentiate itself from the competition. Moreover, it is widely accepted that there are two types: i) cost advantage; or ii) value advantage (Yoo et al., 2006). These advantages, when designed, developed and managed accordingly have the potential to provide an organisation with a competitive edge (Grant, 1991; Yoo et al. 2006). An interesting and applicable development of this concept is that of the efficient frontier, originally from finance theory (Markowitz, 1952) but more recently developed within management theory (Lowe and Locke, 2006; Steuer et al., 2011) and most usefully within the operations management discipline (Akinc and Meredith, 2015; Al-Faraj et al., 1993; Forker and Mendez, 2001). Slack et al., (2012) describe this in a most straightforward manner, explaining that companies which lie on the efficient frontier have performance levels that dominate those which do not.

### Methodology

This paper aims to explore the effectiveness and efficiency of Business and Management schools in transferring technology through their KTP schemes. To achieve this the research examines the value and impact of Knowledge Transfer Partnerships (KTPs) by adopting a multiple case study research methodology. Voss et al. (2002) have recommended this approach for theory development as well as theory testing. Considering the dimensions of the proposed model a multiple case study method was chosen (Yin, 2013). In addition an assessment of the impact of knowledge transfer, in relation to the development of a competitive edge in both public and private organisations, is undertaken.

To help explore important characteristics the authors have, as a development from the literature, created an 'extended' Ansoff matrix (adapted from Sharifi et al., 2009, based on Ansoff, 1957). According to Ansoff (1965), the four major types of growth opportunities are market penetration, market expansion, product expansion and diversification growth as represented in Figure 1.

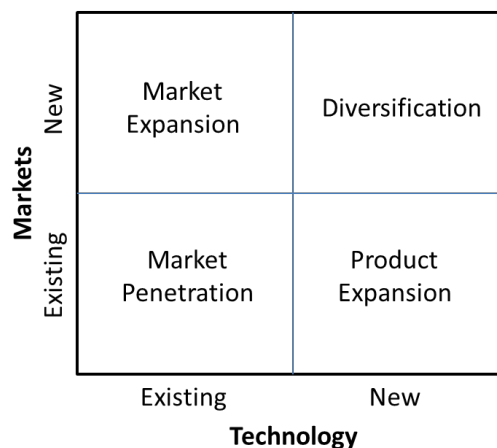


Figure 1 - Ansoff matrix for growth strategy (adapted from Ansoff, 1965)

But what are these? Our interpretation is that: Market Penetration involves an organisation seeking increased sales for current services/products in its existing

markets; Market Expansion is where sales are increased by taking services/products into new (perhaps international) markets; Product Expansion is seeking increased sales by developing new or improved services/products for its current markets; Diversification growth increases sales by developing new services/products and taking these into fresh (perhaps international) markets. The Ansoff Matrix was extended by Sharifi et al. (2009) who proposed that companies traditionally extended the sales of their existing products by moving from sector 1 to sectors 2 and 3 through cost and operational efficiencies and where possible aligning their existing supply chain to meet this new shift in emphasis (see Figure 2).

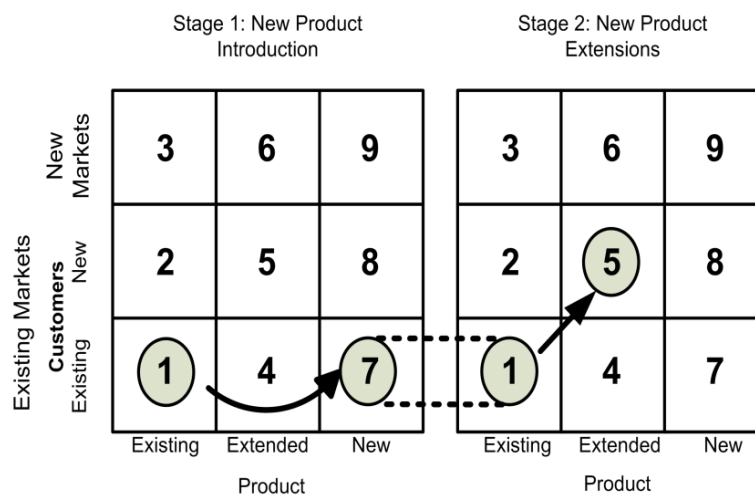


Figure 2 - Extended Ansoff matrix for growth strategy (Sharifi et al., 2009)

Extending the product range through a shift from sector 1 to sectors 4, 5 and 6 involves a redesign or modularisation of the product to capitalise on new opportunities in customisation and product platforms. Typically a redesign of the supply chain is often required with a shift in emphasis from cost to flexibility Sharifi et al. (2009). From this concept the authors adapted the idea to allow comparison and evaluation regards perceived change/knowledge transfer within organisations, initially from both the knowledge base partner (the University) and the company base partner (the host organisation). Please see Figure 3. This adapted Sharifi et al, 2009 model enabled coding & assessment of the know-how of the knowledge base and the company base partner, plus aspects of know-how & sustainability of the organisation. Both Ansoff (1965) and Sharifi et al. (2009) represented aspects of the market within their models. This aspect has been included on the horizontal axis here as per Figure 3.

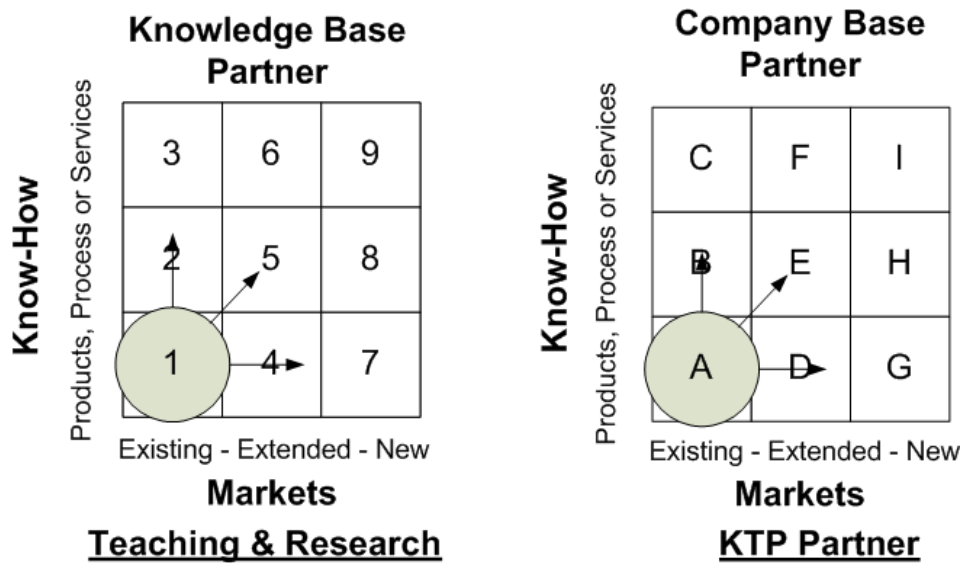


Figure 3 - Extended Ansoff matrix for Knowledge Transfer (A) (adapted from Sharifi et al, 2009)

Applying this matrix to the data shows that a number of transitions can be observed through a KTP for both the knowledge base and the company base partners – using the longitudinal data available – which according to Nagati and Rebolledo (2013) can provide a better understanding of the relationships between variables.

## Findings

Table 1 presents an overview of the 13 projects, where 7 are manufacturing and private sector based and 6 are healthcare and public sector based. The success of the KTP from the university and the enterprise was captured through both financial and non-financial measures of the KTP, often recorded via an intangible benefits log.

Table 1 - Company profiles and project focus

	Sector Category	KTP Grant	KTP Project	Duration	Focus Product (P1), Process (P2) People (P3) Operations (O1) Organisation (O2) Technology (T) Marketing (M) Strategy (S)
C1	Manufacturing (Pharma)	£66,917.00	Integrated Enterprise and web based SCM system	2yrs	P3, O1, O2, T
C2	Manufacturing (Food)	£73,573	Six Sigma methods to drive a cultural change	2yrs	P1, P2, T, M
C3	Manufacturing (Oil and Gas)	£65,453	IT strategy	2yrs	P3, O1, O2, T
C4	Manufacturing (ICT)	£41,037.13	Integrate business systems	2yrs	P1, T, S
C5	Manufacturing (Automotive)	£63,423	IT strategy	2yrs	P3, O1, O2, T, S
C6	Architectural/design	£64,333	Business intelligence System	2yrs	P3, O1, O2, T
C7	Manufacturing (Food)	£44,300.86	Process Improvement: introducing new machinery and processes	2yrs	P1, P2, T1
C8	Service Sector (Healthcare)	£75,692	Improve tPCT's logistical assets	2yrs	P2, P3, O1, O2, T
C9	Service Sector (NHS Trust)	£66,329	SCM healthcare services - patient-blamed non-attendance ("did not attend" or "DNA") at outpatient clinics	2yrs	P2, P3, T, S
C10	Service Sector (NHS Trust)	£129,761	• Medical bed utilisation & utilisation in accident and emergency (A&E)	3yrs	P2, P3, T, S

			services		
C11	Service Sector (NHS Trust)	£65,092.00	Design and management of a patient transport service	2yrs	P2, P1, P3 T, S
C12	Service Sector (tPCT)	£61,486	Operations Management Planning Process	2yrs	P2, P3, T, S
C13	Service Sector (NHS B&A))	£62,475	Healthcare new premises development processes & service integration	2yrs	P1, P2, P3, T, S

## Discussion

The authors have taken the extended Ansoff matrix for Knowledge Transfer (Figure 1). Figure 4 shows a representation of the manufacturing and healthcare organisations position, as defined by the interpretation of the Key Sources of Information (in Table 1) before the two year knowledge transfer project has started. A line of best fit has been created and applied (the dotted line).

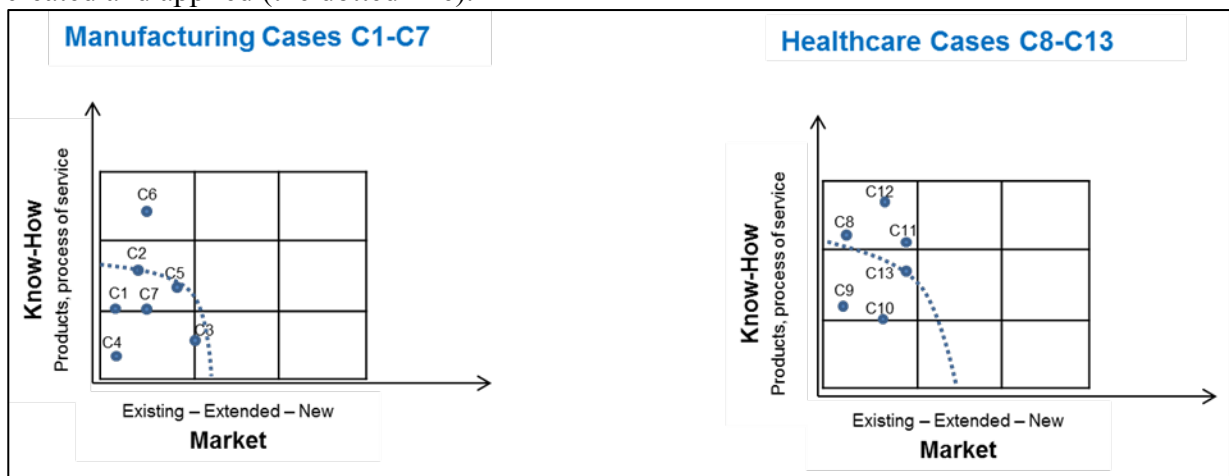


Figure 4 - The organisations' state before the KTP

This figure clearly shows the interpreted position, pre-intervention, of the multiple companies. The grouping makes for an interesting presentation, especially given sector specificity. This snapshot identifies the spread of know-how and development (c.f. Akinc and Meredith, 2015; Al-Faraj et al., 1993; Forker and Mendez, 2001), indicating by comparison the slightly greater know-how within the healthcare companies.

Figure 5 shows a representation of the manufacturing and healthcare organisations position, after the two-year knowledge transfer project, as defined by the interpretation of the Key Sources of Information. Every organisation has improved following the interpretation applied. The additional dotted line (line of best fit) demonstrates this visually.

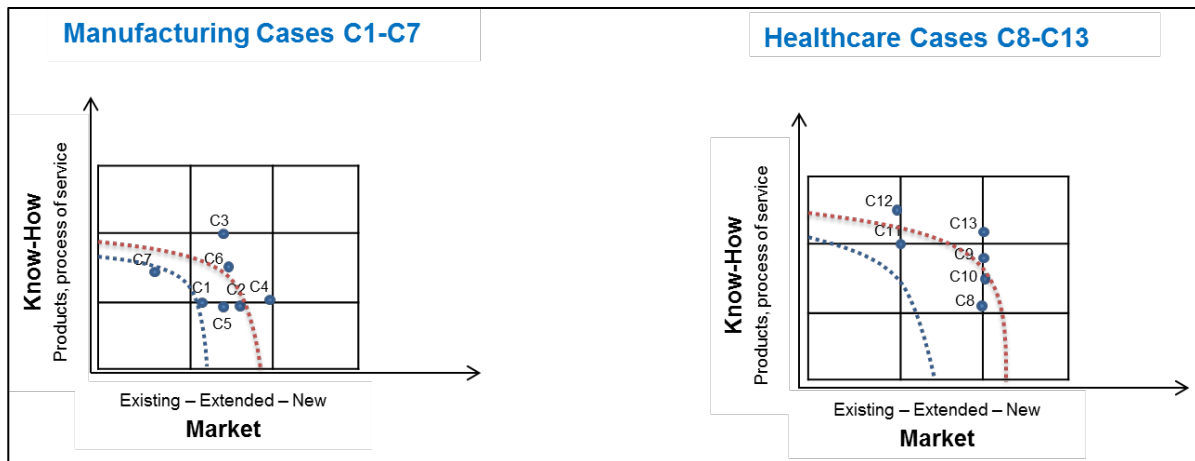


Figure 5 - The organisations' state after the KTP

Comparing the Healthcare examples with Manufacturing identifies that ‘improvement’ is more pronounced with the former. From experience the authors believe that many manufacturing organisations are actually reasonably efficient at knowledge transfer and implementation; because they have tangibly developed these skills (c.f. Maldonado-Guzmán, et al., 2016). Those organisations that have survived over the past several years have had to rapidly adapt or they would fail, this appears to fit with the work of Bessant, et al. (2003) which looked at the possibilities of transferring appropriate practice during uncertain and turbulent environments. In Healthcare the use of some of the techniques that are considered standard in manufacturing (such as lean) are still quite innovative (Bamford and Griffen, 2008; Cheng et al., 2015; Papalexi et al., 2016) and therefore there exists the potential for even greater impact, or a critical contribution (Liu et al., 2014) - something tangibly demonstrated with the results of these knowledge transfer programmes and the results of this paper.

## Conclusions

This paper potentially adds to the technology transfer literature with an analysis of the role of universities. The paper assesses the impact of knowledge transfer, in relation to the development of a competitive edge and proposes some initial frameworks for potential application and use.

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